

STATE OF SOUTH CAROLINA
BEFORE THE PUBLIC SERVICE COMMISSION
DOCKET NO. 2015-54-E

In re: Petition of South Carolina
Electric & Gas Company for
Approval to Participate in a
Distributed Energy Resource
Program

)
)
) DIRECT TESTIMONY OF
) JOHN D. WILSON ON BEHALF OF
) SOUTH CAROLINA COASTAL
) CONSERVATION LEAGUE AND
) SOUTHERN ALLIANCE FOR CLEAN
) ENERGY
)
)

1 **Q. MR. WILSON, PLEASE STATE YOUR NAME, POSITION, AND**
2 **BUSINESS ADDRESS.**

3 A. My name is John D. Wilson. I am Director of Research for Southern Alliance
4 for Clean Energy (“SACE”), and my business address is 1810 16th Street, NW,
5 3rd Floor, Washington, DC 20009.

6 **Q. PLEASE STATE BRIEFLY YOUR EDUCATION, BACKGROUND AND**
7 **EXPERIENCE.**

8 A. I graduated from Rice University in 1990 with a Bachelor of Arts degree in
9 physics and history. I received a Master in Public Policy from the John F.
10 Kennedy School of Government at Harvard University in 1992 with an
11 emphasis in energy and environmental policy, and economic and analytic
12 methods. Since 1992, I have worked in the private, non-profit and public sectors
13 on a wide range of public policy issues, usually related to energy, environmental
14 and planning topics.

1 I became the Director of Research for SACE in 2007. I am the senior
2 staff member responsible for SACE's utility regulatory research and advocacy,
3 as well as energy resource analysis. In this capacity, I am responsible for
4 leading dialogue with utilities and regulatory officials on issues related to
5 resource planning and financial regulation, particularly as they relate to energy
6 efficiency, renewable energy, and conventional generation resources. This takes
7 the form of formal testimony, comments, presentations and/or informal meetings
8 in the states of Georgia, Florida, North Carolina and South Carolina, and with
9 respect to the Tennessee Valley Authority. A copy of my resume is attached as
10 Wilson Exhibit 1.

11 **Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE COMMISSION?**

12 A. Yes, I testified before the Commission in Docket No. 2007-358-E, which
13 concerned Duke Energy Carolinas, LLC's ("DEC") "Save-a-Watt" energy
14 efficiency program; Docket No. 2009-226-E, a DEC general rate case; Docket
15 No. 2013-392-E, DEC and North Carolina Electric Membership Corporation's
16 application for certification of the Lee gas plant; and Docket No. 2014-246-E,
17 the generic proceeding to implement the Distributed Energy Resource ("DER")
18 Program Act. I also recently submitted testimony in Commission Docket No.
19 2015-53-E and 2015-55-E relating to the applications of Duke Energy Progress,
20 Inc. and Duke Energy Carolinas, LLC to establish distributed energy resource
21 programs.

1 **Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS CASE?**

2 A. I am testifying on behalf of SACE and South Carolina Coastal Conservation
3 League (“CCL”).

4 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

5 A. The purpose of my testimony is to support the 20-year term proposed by South
6 Carolina Electric & Gas (“SCE&G” or “the Company”) for its utility-scale
7 Power Purchase Agreement (“PPA”) solicitation, and to provide a
8 recommendation for additional terms. In SCE&G witness John H. Raftery’s
9 testimony, he describes SCE&G’s plan to issue a Request for Proposals (“RFP”)
10 for utility-scale solar projects between 1 megawatt (“MW”) and 10 MW in size
11 and to accept bids at 20-year length PPAs.¹

12 **Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS TO THE**
13 **COMMISSION.**

14 A. I recommend that the Commission approve SCE&G’s proposal to issue an RFP
15 seeking 20-year term PPAs and recommend allowing SCE&G to solicit and
16 consider bids for terms of 25 and 30 years, in addition to 20-year offers.

17 **Q. ARE YOU SPONSORING ANY EXHIBITS?**

18 A. Yes, in addition to Wilson Exhibit 1, I am sponsoring a report, *Impact of Limited*
19 *Solar Power PPAs to 10 Years*, published by SACE in March 2015. I directed
20 the project and conducted much of the research. This report is marked as Wilson
21 Exhibit 2.

¹ Direct Testimony of John H. Raftery at 6.

1 **Q. PLEASE BRIEFLY DESCRIBE SCE&G’S PLAN FOR ISSUING A**
2 **UTILITY-SCALE SOLAR RFP.**

3 A. To meet the utility-scale requirements of Act 236, SCE&G plans to solicit
4 proposals from qualified developers for new renewable energy capacity located
5 in the Company’s retail service area in South Carolina.² SCE&G anticipates
6 bringing online a total of 48.3 MW of utility scale capacity by December 31,
7 2020 and SCE&G anticipates that it will enter into PPAs with developers for a
8 term of 20 years.³ The Companies will require bidding facilities to be between 1
9 and 10 MW and intends for 32.3 MW to be placed in-service before 2017 in
10 order to ensure that the bid pricing reflects the benefits of the federal investment
11 tax credit.⁴

12 **Q. WOULD YOU RECOMMEND THAT SCE&G SOLICIT PPAS WITH**
13 **TERMS OF 20 YEARS AS IT PROPOSES?**

14 A. Yes. PPAs of 20 years or more typically have lower financing costs and lower
15 prices per kWh than shorter term contracts.

16 **Q. WHY ARE LONGER TERM PPA TERMS PREFERABLE?**

17 A. Prices are lower for longer-term PPAs. Customers pay less in the short term and
18 in the long term, customers are not at risk of a price increase, although there is
19 some risk that customers will forego future opportunities for lower cost
20 resources such as newer, cheaper solar facilities.

² *Id.* at 5–7.

³ *Id.*

⁴ *Id.*

1 I formed my opinion that prices are lower for longer-term PPAs than
2 short-term PPAs using two types of evidence. First, I have had numerous
3 conversations with developers of solar, wind, biomass-fueled, and natural gas
4 power plants during the years I have worked at SACE, including a number of
5 specific inquiries over the past year. Each and every developer has agreed that
6 they can offer a significantly lower price to a utility customer for a given project
7 using longer PPA terms because longer terms lower the financing costs for solar
8 projects.

9 While there may not be much difference in market prices between 30 and
10 35 year PPAs, the price difference grows as the term lengths shrink to 25, 20
11 and even shorter term PPAs. I have found that solar developers believe it is a
12 best practice to contract for 20 years or more, and most developers believe the
13 terms should be even longer to enable the least-cost procurement.

14 Second, I performed a financial analysis to quantify the price difference
15 between a 10 year and a 20 year PPA term. This analysis, attached as Wilson
16 Exhibit 2, indicates that a 10 year PPA will have a levelized price that is 2 cents
17 per kWh (30%) higher than the price for a 20 year PPA.

18 **Q. HOW COMMON ARE PPA TERMS OF LESS THAN 20 YEARS?**

19 A. Scarce. In a recent Lawrence Berkeley Laboratory (“LBL”) study, only two of
20 80 PPAs had 10 year terms. Those two PPA contracts are highly unusual “4-year
21 ‘bridge’ PPAs ... whereby the buyer takes 100% of the output for the first four

1 years and then, once a long-term contract with an investor-owned utility begins
2 in 2019, just 1% of the output in the last six years.”⁵

3 The LBL PPA contract sample set had a maximum term of 34 years, a
4 mean of 23.2 years, and a median of 25 years, with the capacity-weighted
5 average being 23.4 years. I would summarize the prevailing industry practice as
6 25 year PPAs with 20 year PPAs also being very common.

7 **Q. WHAT ARE SOME RECENT EXAMPLES OF SOLAR PPAS IN THE**
8 **SOUTHEAST WITH 20 YEAR TERMS OR LONGER?**

9 A. Several major utilities have executed 20-year or longer utility-scale solar PPAs
10 in the past few years at prices at or below the utilities’ avoided costs.

11 • Duke Energy Renewables entered into a 20-year PPA with three academic
12 and medical institutions in Washington, DC for a 52 MW solar project
13 located near Elizabeth City, NC. The price has not been disclosed, but it is
14 represented to be “below what they are paying for brown power” and that
15 “solar beat wind in terms of final delivered cost to the customers.”⁶

⁵ Mark Bolinger and Samantha Weaver, Lawrence Berkeley National Laboratory LBNL-6912E, *Utility-Scale Solar 2013: An Empirical Analysis of Project Cost, Performance, and Pricing Trends in the United States*, n. 44 (September 2014).

⁶ Jennifer Runyon, “Huge North Carolina Solar Project Could ‘Move the Needle’ for Solar’s Possibilities,” *Renewable Energy World* (July 10, 2014), <http://www.renewableenergyworld.com/rea/news/article/2014/07/huge-north-carolina-solar-project-could-move-the-needle-for-solars-possibilities>.

- 1 • Tennessee Valley Authority entered into a 20-year contract with NextEra
2 Energy for an 80 megawatt solar facility in northern Alabama for a reported
3 \$61/MWh.⁷
- 4 • Gulf Power Company entered into 25-year contracts with HelioSage, LLC
5 for three solar facilities with a total capacity of 120 MW in northwest
6 Florida. The prices have not been disclosed, but “are projected to produce
7 savings between \$2.8 and \$17.4 million.”⁸
- 8 • Georgia Power Company entered into five 30-year contracts, one 25-year
9 contract, and four 20-year contracts for solar facilities with a total capacity
10 of 515 MW. The prices have not been disclosed, but “the ASI winning bids
11 were procured at an average cost of less than 6.5 cents per kilowatt-hour.”⁹
- 12 Georgia Power had a particularly effective RFP process. As Georgia
13 Power noted in its application, the process “Demonstrat[ed] both the robust
14 nature of the marketplace and its ability to provide competitive pricing when
15 challenged to do so through a market based RFP.”¹⁰ Georgia Power “considered
16 all proposals including those offering any and all financial structures, and bids

⁷ Travis Loller (Associated Press), “TVA Nears First Large-Scale Solar Buy,” *The Tennessean* (February 12, 2015), <http://www.tennessean.com/story/news/2015/02/12/tva-nears-first-large-scale-solar-buy/23326207/>.

⁸ Florida Public Service Commission, Staff Memorandum in *Petition for approval of energy purchase agreements between Gulf Power Company and Gulf Coast Solar Center I, LLC, Gulf Coast Solar Center II, LLC, and Gulf Coast Solar Center III, LLC.*, Docket No. 150035-EI (April 2, 2015).

⁹ Georgia Power Co., *Application for the Certification of the 2015 and 2016 Advanced Solar Initiative Prime Power Purchase Agreements and Request for Approval of the 2015 Advanced Solar Initiative Power Purchase Agreements*, Georgia Public Service Commission Docket No. 38877 (Oct.10, 2014), at 19.

¹⁰ *Id.*

1 with terms ranging from fifteen to thirty years.”¹¹ Georgia Power’s RFP
2 resulted in offers for “5,100 MW through 142 unique proposals from 56
3 different bidders.”¹² The financial structures of the proposals were not
4 disclosed, but all winning bids were PPAs.

5 I also note that Georgia Power selected the projects in three groups, in
6 order of competitiveness. The third, least competitive, projects were the four 20
7 year contracts. Thus, Georgia Power ranked the longer term PPAs as more
8 competitive than the shorter term PPAs.

9 **Q. BASED ON THE PPA CONTRACTS YOU HAVE JUST SUMMARIZED,**
10 **WHAT IS YOUR RECOMMENDATION FOR THE COMMISSION?**

11 A. Through its DER programs, SCE&G also has the opportunity to execute utility-
12 scale solar PPAs at prices that may be at or below the value of DER generation
13 for the Company. Recent examples from TVA, Duke Energy Renewables, Gulf
14 Power Company, and Georgia Power Company, illustrates that the use of long-
15 term contracts (of 20 years or more) may result in lower-priced PPAs for South
16 Carolina consumers and no additional costs being recovered in riders.

17 Accordingly, I recommend that the Commission approve SCE&G’s
18 proposal to solicit offers with terms of 20 years and allow SCE&G to solicit
19 even longer-term offers of 25 and 30 years.

¹¹ *Id.* at 13.

¹² *Id.*

1 **Q. DOES THAT CONCLUDE YOUR DIRECT TESTIMONY?**

2 A. Yes, it does.

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EXPERIENCE**Southern Alliance
for Clean Energy**

- Director of Research, Asheville, North Carolina and Washington, DC, 2007 – present
- Manage technical and regulatory advocacy
 - Conduct supporting research and policy development across all program areas

**Galveston-Houston
Association for
Smog Prevention**

- Executive Director, Houston, Texas, 2001 – 2006
- Member, Regional Air Quality Planning Committee
 - Member, Transportation Policy Technical Advisory Committee
 - Member, Steering Committee, TCEQ Interim Science Committee
 - Awards & recognition from the City of Houston, *Houston Press*, and environmental groups

**The Goodman
Corporation**

- Senior Associate, Houston, Texas, 2000 – 2001
- Transportation and Urban Planning Consulting
 - Project Manager, Houston Main Street Corridor
 - Project Manager, Houston Downtown Circulation Study
 - Project Manager, Austin Corridor Planning
 - Project Manager, Ft. Worth Berry Street Corridor Initiative

Florida Legislature

- Senior Legislative Analyst and Technology Projects Coordinator, Office of Program Policy Analysis and Government Accountability, Tallahassee, Florida, 1997- 1999
- Coordinator, Florida Government Accountability Report, 1999
 - Coordinator, Project Management Software Implementation, 1999
 - Creator and Editor, *Florida Monitor Weekly*, 1998 - 99
 - Author or team member for reports on water supply policy, environmental permitting, community development corporations, school district financial management and other issues – most recommendations implemented by the 1998 and 1999 Florida Legislatures

**Florida State
University**

- Environmental Management Consultant, Tallahassee, Florida, 1997
- Project staff, *Florida Assessment of Coastal Trends*, 1997

**Houston Advanced
Research Center**

- Research Associate, Center for Global Studies, The Woodlands, Texas, 1992 - 96
- Coordinator, Houston Environmental Foresight, 1993 - 96
 - Coordinator, Rio Grande/Rio Bravo Basin Initiative, 1992 - 94
 - Secretary, Task Force on Climate Change in Texas, 1992 - 94
 - Researcher, *Policy Options: Responding to Climate Change in Texas*, 1992 - 93

**US Environmental
Protection Agency**

- Student Assistant, Climate Change Division, Washington, DC, 1991 - 92
- Special Achievement Award, 1991

EDUCATION**Harvard University**

- Master in Public Policy, John F. Kennedy School of Government, 1992
- Concentration areas: Environment, negotiation, economic and analytic methods

Rice University

- Bachelor of Arts, conferred *cum laude*, 1990
- Majors: Physics (with honors) and history

**Additional Training
and Experience**

Spanish language; Advanced computer skills; Served and led political committees for the Sierra Club and Clean Water Action; Certified Master Wildlife Conservationist, Leon County Extension Service

PUBLICATIONS**Expert Witness
Testimony**

John D. Wilson, Direct Testimony on Behalf of South Carolina Coastal Conservation League and Southern Alliance for Clean Energy, *In the Matter of Petition of the Office of Regulatory Staff to Establish Generic Proceeding Pursuant to the Distributed Energy Resource Program Act, Act No. 236 of 2014, Ratification No. 241, Senate Bill No. 1189*, South Carolina Public Service Commission Docket No. 2014-246-E (December 23, 2014).

Hamilton Davis and John D. Wilson, Joint Direct Testimony on Behalf of South Carolina Coastal Conservation League and Southern Alliance for Clean Energy, *In the Matter of Joint Application of Duke Energy Carolinas, LLC and North Carolina Electric Membership Corporation for a Certificate of Environmental Compatibility and Public Convenience and Necessity for the Construction and Operation of a 750MW Combined Generating Plant Near*

Anderson, SC, South Carolina Public Service Commission Docket No. 2013-392-E (December 10, 2013).

John D. Wilson, Direct Testimony on Behalf of Southern Alliance for Clean Energy, *In the Matters of Georgia Power Company's 2013 Integrated Resource Plan and Application for Decertification of Plant Branch Units 3 and 4, Plant McManus Units 1 and 2, Plant Kraft Units 1-4, Plant Yates Units 1-05, Plant Boulevard Units 2 and 3, and Plant Bowen Unit 6*, Georgia Public Service Commission Docket No. 36498 (May 10, 2013).

John D. Wilson, allowable ex parte briefing on behalf of Southern Alliance for Clean Energy, South Carolina Coastal Conservation League, and Upstate Forever, in *Progress Energy Carolinas, Incorporated's Integrated Resource Plan (IRP)*, South Carolina Public Service Commission Docket NO. 2011-8-E and in *Duke Energy Carolinas, LLC – 2011 Integrated Resource Plan*, South Carolina Public Service Commission Docket NO. 2011-10-E (December 21, 2011).

John D. Wilson, allowable ex parte briefing on behalf of Southern Alliance for Clean Energy, South Carolina Coastal Conservation League, and Upstate Forever, in *South Carolina Electric & Gas Company's Integrated Resource Plan*, South Carolina Public Service Commission Docket NO. 2011-9-E (June 1, 2011).

John D. Wilson, Direct Testimony on Behalf of Southern Alliance for Clean Energy, *In the Matters of Georgia Power Company's Application for Certification of its Demand Side Management Program*, Georgia Public Service Commission Docket No. 31082 (May 7, 2010).

John D. Wilson, Direct Testimony on Behalf of Southern Alliance for Clean Energy, *In the Matters of Georgia Power Company's Application for Approval of its 2010 Integrated Resource Plan*, Georgia Public Service Commission Docket No. 31081 (May 7, 2010).

John D. Wilson, Direct Testimony on Behalf of Environmental Defense Fund, The Sierra Club, Southern Alliance for Clean Energy, and the Southern Environmental Law Center, *In the Matter of Investigation of Integrated Resource Planning in North Carolina – 2009*, North Carolina Utilities Commission Docket No. E-100, Sub 124 (February 19, 2010).

John D. Wilson, Direct Testimony on Behalf of Environmental Defense Fund, the Natural Resources Defense Council, the South Carolina Coastal Conservation League, Southern Alliance for Clean Energy, and the Southern Environmental Law Center, *Application of Duke Energy Carolinas, LLC for Authority to Adjust and Increase Its Electric Rate and Charges*, South Carolina Public Service Commission Docket No. 2009-226-E (November 6, 2009).

John D. Wilson, Direct Testimony & Exhibits on behalf of Southern Alliance for Clean Energy and the Natural Resources Defense Council in *RE: Commission Review of Numeric Conservation Goals Florida Power & Light Company*, Florida Public Service Commission Docket No. 080407-EG, also filed in Dockets 080408-EG through 080413-EG (July 6, 2009).

John D. Wilson, Testimony on behalf of Environmental Defense Fund, Natural Resources Defense Council, Southern Alliance for Clean Energy, and Southern Environmental Law Center in *Application of Duke Energy Carolinas, Inc. for Approval of Save-a-Watt Approach, Energy Efficiency Rider and Portfolio of Energy Efficiency Programs*, North Carolina Utilities Commission Docket No. E-7, Sub 831 (June 19, 2009).

John D. Wilson, Surrebuttal Testimony on Behalf of Environmental Defense, the South Carolina Coastal Conservation League, Southern Alliance For Clean Energy and the Southern Environmental Law Center, *In the Matter of Application of Duke Energy Carolinas, LLC for Approval of Energy Efficiency Plan Including an Energy Efficiency Rider and Portfolio of Energy Efficiency Programs*, South Carolina Public Service Commission Docket No. 2007-358-E (January 28, 2008).

Comments and Presentations Related to Electric Utilities
(Lead author or significant contributor)

Southern Alliance for Clean Energy, *Technical Comments on the 2015 Tennessee Valley Authority Integrated Resource Draft Plan* (April 27, 2015).

Southern Alliance for Clean Energy et. al, *Comments on the 2015 Tennessee Valley Authority Integrated Resource Plan Supplemental Environmental Impact Statement* (April 27, 2015).

John D. Wilson, *The Clean Power Plan Can Be Implemented While Maintaining Reliable Electric Service in the Southeast*, panel presentation to FERC Eastern Region Technical Conference on EPA's Clean Power Plan Proposed Rule (March 11, 2015).

Southern Alliance for Clean Energy and Sierra Club, comments filed in *2014 Biennial Integrated Resource Plans and Related REPS Compliance Plans*, North Carolina Utilities

Commission Docket No. E-100, Sub 141 (March 2, 2015).

John D. Wilson and Natalie Mims, *Views on TVA EE Modeling Approach*, Presentation to TVA “Evaluating Energy Efficiency in Utility Resource Planning” Meeting (February 10, 2015).

Southern Alliance for Clean Energy et al, *Shawnee Fossil Plant Units 1 and 4, Comments on the Draft Environmental Assessment*, submitted to Tennessee Valley Authority (December 9, 2014).

Southern Alliance for Clean Energy, Sierra Club, and South Carolina Coastal Conservation League, comments filed *In the Matter of Rulemaking Proceeding to Consider Revisions to Commission Rule R8-60 on Integrated Resource Planning*, North Carolina Utilities Commission, Docket No. E-100, Sub 111 (December 8, 2014).

South Carolina Coastal Conservation League and Southern Alliance for Clean Energy, comments filed *In the Matter of Duke Energy Progress, Inc.’s Integrated Resource Plan*, South Carolina Public Service Commission, Docket No. 2014-8-E (December 3, 2014).

Southern Alliance for Clean Energy, *Comments on the Environmental Protection Agency’s Proposed Clean Power Plan*, Docket No. OAR-2013-0602 (December 1, 2014).

John D. Wilson, “TVA IRP Update,” TenneSEIA Annual Meeting (November 19, 2014).

Southern Alliance for Clean Energy, *Comments on Allen Fossil Plant Emission Control Project Draft Environmental Assessment*, submitted to Tennessee Valley Authority (August 7, 2014).

Southern Alliance for Clean Energy, *TVA’s On-Peak Dependable Capacity Method*, submitted to Tennessee Valley Renewable Information Exchange (June 10, 2014).

Southern Alliance for Clean Energy, *HVDC Wind Assessment*, submitted to Tennessee Valley Renewable Information Exchange (May 27, 2014).

Stephen A. Smith, letter to Tennessee Valley Renewable Information Exchange regarding in-Valley wind resource data provided by Southern Wind Energy Association (May 20, 2014).

Southern Alliance for Clean Energy, *Tennessee Valley Utility-Scale Solar Assessment*, submitted to Tennessee Valley Renewable Information Exchange (May 13, 2014).

John D. Wilson, “Rates vs. Energy Efficiency,” 2013 ACEEE National Conference on Energy Efficiency as a Resource (September 2013).

Sierra Club and Southern Alliance for Clean Energy, reply comments filed in *Investigation of Integrated Resource Planning in North Carolina – 2012*, North Carolina Utilities Commission Docket No. E-100, Sub 137 (March 6, 2013).

Sierra Club and Southern Alliance for Clean Energy, comments filed in *Investigation of Integrated Resource Planning in North Carolina – 2012*, North Carolina Utilities Commission Docket No. E-100, Sub 137 (February 5, 2013).

South Carolina Coastal Conservation League and Southern Alliance for Clean Energy, comments filed in *Progress Energy Carolinas, LLC’s Integrated Resource Plan*, South Carolina Public Service Commission Docket NO. 2012-8-E (January 25, 2013).

South Carolina Coastal Conservation League, Southern Alliance for Clean Energy, and Upstate Forever, comments filed in *Duke Energy Carolinas, LLC’s Integrated Resource Plan*, South Carolina Public Service Commission Docket NO. 2012-10-E (December 6, 2012).

Southern Alliance for Clean Energy, comments filed in *Investigation of Integrated Resource Planning in North Carolina – 2010-2011*, North Carolina Utilities Commission Docket No. E-100, Sub 128 (January 13, 2012).

Southern Alliance for Clean Energy, and South Carolina Coastal Conservation League, comments filed in *Progress Energy Carolinas, Incorporated’s Integrated Resource Plan (IRP)*, South Carolina Public Service Commission Docket NO. 2011-8-E (October 31, 2011).

Southern Alliance for Clean Energy, South Carolina Coastal Conservation League, and Upstate Forever, comments filed in *Duke Energy Carolinas, LLC’s Integrated Resource Plan*, South Carolina Public Service Commission Docket NO. 2011-10-E (October 31, 2011).

Southern Alliance for Clean Energy, comments on *Tennessee Valley Authority’s Renewable Standard Offer*, submitted to Tennessee Valley Authority (September 6, 2011).

Southern Alliance for Clean Energy, South Carolina Coastal Conservation League, and Upstate Forever, comments filed in *South Carolina Electric & Gas Company's Integrated Resource Plan*, South Carolina Public Service Commission Docket NO. 2011-9-E (April 15, 2011).

Southern Alliance for Clean Energy, comments filed in *Investigation of Integrated Resource Planning in North Carolina – 2010*, North Carolina Utilities Commission Docket No. E-100, Sub 128 (February 10, 2011).

John D. Wilson, "Energy Efficiency Delivers Growth and Savings for Florida," testimony before Energy & Utilities Subcommittee, Florida House of Representatives (February 2011).

Southern Alliance for Clean Energy, comments filed in *RE: Petition for Approval of Demand-Side Management Plan of Progress Energy Florida*, Florida Public Service Commission Docket No. 100160-EG (June 3, 2011).

Southern Alliance for Clean Energy, comments filed in *RE: Petition for Approval of Demand-Side Management Plan of Progress Energy Florida*, Florida Public Service Commission Docket No. 100160-EG, also filed in Docket No. 100155-EG (April 25, 2011).

Southern Alliance for Clean Energy, comments filed in *RE: Petition for Approval of Demand-Side Management Plan of Gulf Power Company*, Florida Public Service Commission Docket No. 100154-EG, also filed in Dockets 100155, 59, and 60-EG (December 22, 2010).

Environmental Defense Fund, Southern Alliance for Clean Energy, and Southern Environmental Law Center, reply comments in *Rulemaking Proceeding to Implement Session Law 2007-397*, North Carolina Utilities Commission Docket No. E-100, Sub 113 (November 19, 2010).

Southern Alliance for Clean Energy, *Comments in Response to Tennessee Valley Authority's November 16, 2010 Release of its Draft Integrated Resource Plan and Accompanying Environmental Impact Statement (No. 20100379) for Public Review and Comment* (November 15, 2010).

Environmental Defense Fund, Southern Alliance for Clean Energy, and Southern Environmental Law Center, comments in *Rulemaking Proceeding to Implement Session Law 2007-397*, North Carolina Utilities Commission Docket No. E-100, Sub 113 (October 15, 2010).

Environmental Defense Fund, Southern Alliance for Clean Energy, and Southern Environmental Law Center, comments in *Rulemaking Proceeding to Implement Session Law 2007-397*, North Carolina Utilities Commission Docket No. E-100, Sub 113 (October 4, 2010).

South Carolina Coastal Conservation League and Southern Alliance for Clean Energy, comments filed in *In the Matter of Duke Energy Carolinas, LLC's Integrated Resource Plan*, South Carolina Public Service Commission, Docket No. 2014-10-E (November 3, 2014).

Southern Alliance for Clean Energy and Environmental Defense Fund, statement of position letter in *Application for Residential Retrofit and Home Energy Comparison Report Pilot Programs*, North Carolina Utilities Commission Dockets Nos. E-7 Sub 952 and Sub 954 (September 17, 2010).

John D. Wilson, "Energy Efficiency: The Southeast Considers its Options," NAESCO Southeast Regional Workshop (September 2010).

Southern Alliance for Clean Energy, "SACE's Response to Progress Energy Florida's Response to SACE Comments," comments filed in *RE: Petition for Approval of Demand-Side Management Plan of Progress Energy Florida*, Florida Public Service Commission Docket No. 100160-EG (August 3, 2010).

Southern Alliance for Clean Energy, comments filed in *RE: Petition for Approval of Demand-Side Management Plan of Gulf Power Company*, Florida Public Service Commission Docket No. 100154-EG, also filed in Dockets 100155, 57, 59, 60 and 61-EG (July 14, 2010).

John D. Wilson, "Bringing Energy Efficiency to Southerners," Environmental and Energy Study Institute panel on "Energy Efficiency in the South" (April 10, 2010).

John D. Wilson, "The Changing Face of Energy Supply in Florida (and the Southeast)," 37th Annual PURC Conference (February 2010).

John D. Wilson, "Florida Energy Policy Discussion," testimony before Energy & Utilities Policy

Committee, Florida House of Representatives (January 2010).

John D. Wilson, "Building the Energy Efficiency Resource for the TVA Region," presentation on behalf of Southern Alliance for Clean Energy to the Tennessee Valley Authority Integrated Resource Planning Stakeholder Review Group (December 10, 2009).

John D. Wilson, "An Advocates Perspective on the Duke Save-a-Watt Approach," ACEEE 5th National Conference on Energy Efficiency as a Resource (September 2009).

Southern Alliance for Clean Energy, comments in response to *Tennessee Valley Authority (TVA) Staff Report on Preliminary Recommendations on the Four PURPA Standards Under Section 111(d) of the Public Utility Regulatory Policies Act Pursuant to the Energy Independence and Security Act of 2007* (July 27, 2009).

Southern Alliance for Clean Energy, Comments in *RE: Establishment of Rule on Renewable Portfolio Standard*, Florida Public Service Commission Docket No. 080503-EI (December 8, 2008).

Southern Alliance for Clean Energy, Comments in *RE: Establishment of Rule on Renewable Portfolio Standard*, Florida Public Service Commission Docket No. 080503-EI (September 5, 2008).

Southern Alliance for Clean Energy, *Comments on July 11, 2008 RPS Workshop*, Florida Public Service Commission undocketed workshop (July 2008).

Environmental Defense Fund, Natural Resources Defense Council, Southern Alliance for Clean Energy, and Southern Environmental Law Center, further comments in *Investigation of Rate Structures, Policies and Measures that Promote a Mix of Generation and Demand Reduction for Electric Power Suppliers in North Carolina*, North Carolina Utilities Commission Docket No. E-100, Sub 116 (June 23, 2008).

Southern Alliance for Clean Energy, comments on *Energy Efficiency and Demand Response Plan*, submitted to Tennessee Valley Authority (May 6, 2008).

Southern Alliance for Clean Energy, comments on *Renewable Energy and Clean Energy Assessment*, submitted to Tennessee Valley Authority (May 6, 2008).

John D. Wilson, "Utility-Scale Renewable Energy," presentation on behalf of Southern Alliance for Clean Energy to the Board of the Tennessee Valley Authority (March 5, 2008).

John D. Wilson, "Energy Efficiency: Regulating Cost-Effectiveness," Florida Public Service Commission undocketed workshop (April 25, 2008).

Environmental Defense Fund, Natural Resources Defense Council, Southern Alliance for Clean Energy, and Southern Environmental Law Center, initial comments in *Investigation of Rate Structures, Policies and Measures that Promote a Mix of Generation and Demand Reduction for Electric Power Suppliers in North Carolina*, North Carolina Utilities Commission Docket No. E-100, Sub 116 (March 20, 2008).

John D. Wilson, "Clean Energy Solutions for Western North Carolina," presentation to Progress Energy Carolinas WNC Community Energy Advisory Council (February 7, 2008).

Environmental Defense, Southern Alliance for Clean Energy, and Southern Environmental Law Center, reply comments in *Rulemaking Proceeding to Implement Session Law 2007-397*, North Carolina Utilities Commission Docket No. E-100, Sub 113 (December 13, 2007).

Environmental Defense, Southern Alliance for Clean Energy, and Southern Environmental Law Center, comments in *Rulemaking Proceeding to Implement Session Law 2007-397*, North Carolina Utilities Commission Docket No. E-100, Sub 113 (November 12, 2007).

Environmental Defense, Southern Alliance for Clean Energy, and Southern Environmental Law Center, comments in *Rulemaking Proceeding to Implement Session Law 2007-397*, North Carolina Utilities Commission Docket No. E-100, Sub 113 (September 21, 2007).

Southern Alliance for Clean Energy and the Natural Resources Defense Council, *Comments and Suggestions of the Southern Alliance for Clean Energy, and of the Natural Resources Defense Council, Pertaining to Rulemaking on a Renewable Portfolio Standard*, Florida Public Service Commission Undocketed Comments (September 2007).

**Published Papers,
Reports and Books**

Southern Alliance for Clean Energy, *Renewable Energy Standard Offer: A Tennessee Valley Authority Case Study* (November 2012).

Southern Alliance for Clean Energy, *Recommendations For Feed-In-Tariff Program Implementation In The Southeast Region To Accelerate Renewable Energy Development* (March 2011).

John D. Wilson, Tom Franks and J. Richard Hornby, "Seeking Consistency in Performance Incentives for Utility Energy Efficiency Programs," *2010 American Council for an Energy-Efficient Economy Summer Study on Energy Efficiency in Buildings* (August 2010).

John D. Wilson, "Energy Efficiency Program Impacts and Policies in the Southeast," Southern Alliance for Clean Energy (May 2009).

Dennis Creech, Eliot Metzger, Samantha Putt Del Pino, John D. Wilson, *Local Clean Power*, World Resources Institute Issue Briefs (April 2009).

Dennis Creech, Eliot Metzger, Samantha Putt Del Pino, John D. Wilson, *Green in the Grid: Renewable Electricity Opportunities in the Southeast United States*, World Resources Institute Issue Briefs (April 2009).

Southern Alliance for Clean Energy, *Yes We Can: Southern Solutions for a National Renewable Energy Standard* (February 2009).

Southern Alliance for Clean Energy, *Cornerstones: Building a Secure Foundation for North Carolina's Energy Future* (May 2008).

Southern Alliance for Clean Energy, *Bringing Clean Energy to the Southeastern United States: Achieving the Federal Renewable Energy Standard* (February 2008).

Galveston Houston Association for Smog Prevention, *Whiners Matter! Citizen Complaints Lead to Improved Regional Air Quality Control* (June 2006).

Galveston Houston Association for Smog Prevention, *Exceeding the Limit: Industry Violations of New Rule Almost Slid Under State's Radar* (January 2006).

Galveston Houston Association for Smog Prevention, *Mercury in Galveston and Houston Fish: Contamination by Neurotoxin Places Children at Risk* (October 2004).

Environmental Integrity Project and Galveston Houston Association for Smog Prevention, *Who's Counting: The Systematic Underreporting of Toxic Air Emissions* (June 2004).

Galveston Houston Association for Smog Prevention, *Reducing Air Pollution From Houston-Area School Buses* (March 2004).

Galveston Houston Association for Smog Prevention, *Smoke in the Water: Air Pollution Hidden in the Water Vapor from Cooling Towers – Agencies Fail to Enforce Against Polluters* (February 2004).

Office of Program Policy Analysis and Government Accountability, *Florida Water Policy: Discouraging Competing Applications for Water Permits; Encouraging Cost-Effective Water Development*, Report No. 99-06 (August 1999).

John D. Wilson, Janet E. Kohlhase, and Sabrina Strawn, "Quality of Life and Comparative Risk in Houston," *Urban Ecosystems*, Vol. 3, Issue 2 (July 1999).

Office of Program Policy Analysis and Government Accountability, *Review of the Expedited Permitting Process Coordinated by the Governor's Office of Tourism, Trade, and Economic Development*, Report No. 98-17 (October 1998).

Office of Program Policy Analysis and Government Accountability, *Review of the Community Development Corporation Support and Assistance Program*, Report No. 97-45 (February 1998).

Office of Program Policy Analysis and Government Accountability, *Best Financial Management Practices for Florida School Districts*, Report No. 97-08 (October 1997).

Florida Coastal Management Program, *Florida Assessment of Coastal Trends* (June 1997).

Houston Environmental Foresight Committee, *Seeking Environmental Improvement*, Houston Advanced Research Center (January 1996).

Houston Environmental Foresight Science Panel, *Houston Environment 1995*, Houston Advanced Research Center (1996).

Judith Clarkson, John D. Wilson and Wolfgang Roeseler, "Urban Areas," in Gerald R. North, Jurgen Schmandt and Judith Clarson, *The Impact of Global Warming on Texas: A Report of the Task Force on Climate Change in Texas* (1995).

Houston Advanced Research Center, *Policy Options: Responding to Climate Change in Texas*, US EPA and Texas Water Commission (October 1993).

Impact of Limiting Solar Power PPAs to 10 years

Duke Energy favors limiting Power Purchase Agreements (PPAs) for solar power to 10 years. As illustrated in Figure 1, a financial analysis of this practice suggests that the resulting PPA price is roughly 2 c/kWh higher than for a 20 year PPA.

The analysis was performed using the National Renewable Energy Laboratory (NREL) System Advisor Model (SAM). SAM inputs were selected to represent a 50 MW_{AC} solar photovoltaic tracking system located in Anderson County, SC. Financial and other technical inputs were selected based on conversations with several solar energy developers. The inputs reasonably reflect, but do not precisely replicate, terms on which solar developers are able to finance projects.

Utility-scale solar PV systems are typically expected to have a useful life of 35 years. Although some PPAs have been executed for terms of up to 35 years, more typically contract terms are 20-30 years. Although the developers we have spoken with may not represent an industry consensus, all expressed a strong preference for 25 or 30 year terms.

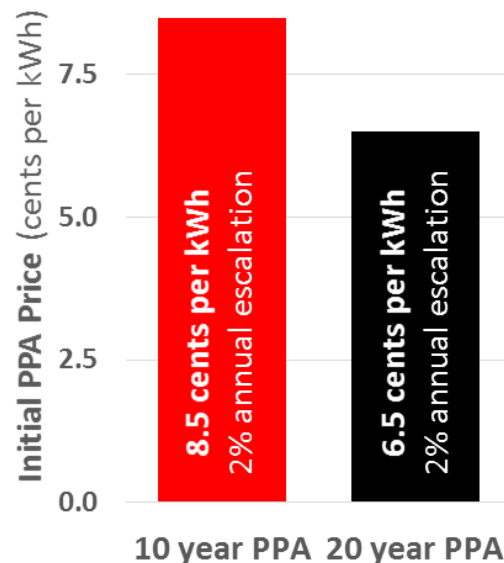
For purposes of this analysis, we compared 10 and 20 year term PPAs. We assumed that, for purposes of securing financing, the project developer would make relatively conservative assumptions regarding the potential revenue. We assumed the developer would plan to seek status as a Qualified Facility and be eligible to sell electricity to the utility at an energy-only rate for the years following the PPA term. We used a rate of 4 c/kWh based on the Duke Energy rates in South Carolina, with an annual escalation rate of 2%. This is likely to be somewhat below the forecast utilized by Duke Energy, but according to developers, banks and other financial reviewers would be unlikely to lend on the basis of a significantly higher rate.

Four scenarios were used to vary the price and terms of the PPAs. Price levels over the lifetime of the project for each PPA scenario as well as the QF rate were established as follows (see Figure 2).

- QF Rate – The financial analysis using only the QF rate assumed above.
- 20y PPA @ 6.5 c/kWh – PPA with 6.5 c/kWh, with a 2% annual escalation rate, for 20 years.
- 10y PPA @ 6.5 c/kWh – PPA with 6.5 c/kWh, with a 2% annual escalation rate, for 10 years.
- 10y PPA @ 8.5 c/kWh – PPA with 8.5 c/kWh, with a 2% annual escalation rate, for 10 years.

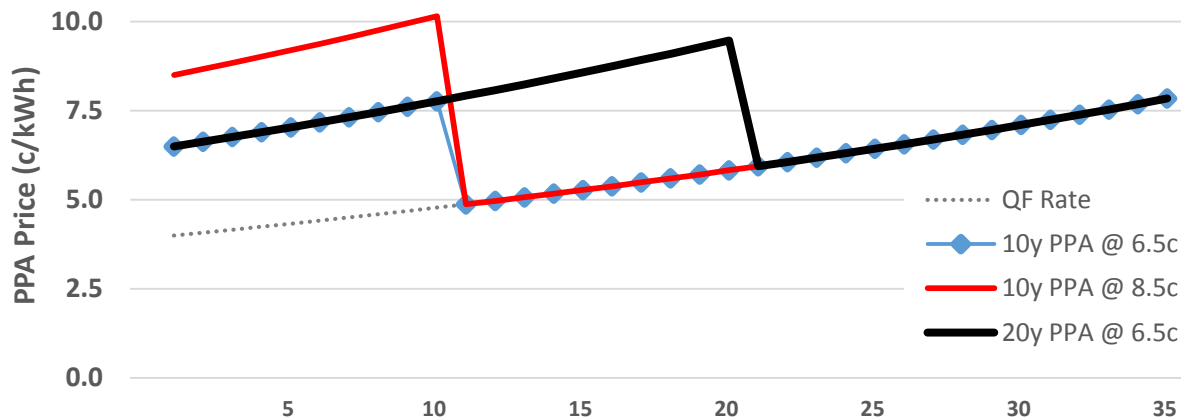
The loan terms were also input at varying levels – 18 years for the QF Rate and 20 year scenarios, and 10 years for the 10 year scenarios.¹

Figure 1: Price Required to Secure Solar Development Financing



Founded in 1985, the Southern Alliance for Clean Energy is a nonprofit organization that promotes responsible energy choices that create global warming solutions and ensure clean, safe, and healthy communities throughout the Southeast.

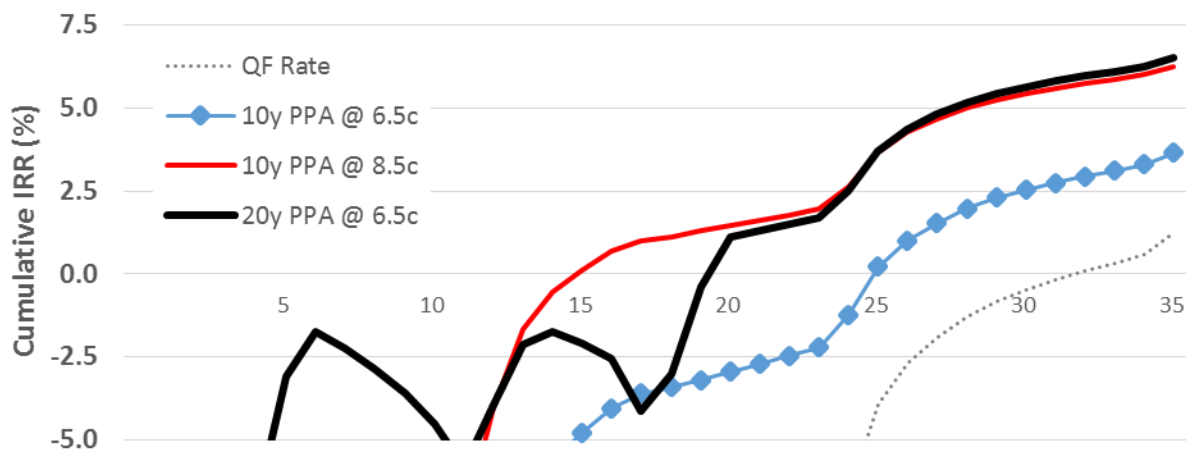
Figure 2: PPA Price Levels in the 4 Scenarios



The IRR for a 10 year PPA at 8.5 c/kWh is roughly equivalent to a 20 year PPA at 6.5 c/kWh, as illustrated in Figure 3. According to developers we consulted, an after-tax cumulative internal rate of return (IRR) of 6-7% is considered reasonable for project development success.

This level of return could not be achieved with either the QF rate or the 10y PPA @ 6.5 c/kWh scenarios. However, it is projected to occur after about 30 years in the other two scenarios.² This suggests that the price impact of limiting PPA duration to 10 years is roughly 2 c/kWh in current market conditions.

Figure 3: Cumulative IRRs in the Four Scenarios



¹ In response to the differences in loan terms and revenue streams across the scenarios, SAM automatically increased the equity (and reduced the debt) in its financial solution for 10 year PPAs as compared to the 20 year PPA or the 35 year QF rate. Solar developers concurred with this feature of the model, as a 10 year PPA would be considered riskier and thus require a potentially larger equity component or a higher debt interest rate.

² It should be noted that a developer would likely take steps to secure the IRR at an earlier date by selling or otherwise securing the long-term returns. In discussions with developers, various feasible financial structures were discussed. Due to the limitations of SAM, the approach chosen was considered to be reasonable for purposes of comparing viable PPA prices under 10 and 20 year PPA contracts.